Completion of spent fuel removal highlights year for K Basins

The Fluor Hanford K Basins Closure (KBC) Project was created in mid-2004 out of the Spent Nuclear Fuel (SNF) Project, and quickly finished the massive 10-year job of removing, from unsatisfactory wet storage conditions, the largest collection of spent (irradiated) fuel in the DOE complex.

Worker adjusts equipment placing grout into KE Basin discharge chute, summer 2004.

The Hanford spent fuel, stored for many years in the K Basins, constituted 80 percent of DOE's spent fuel. It was the largest collection of radioactive materials along the 1,400-mile Columbia River, and accounted for 95 percent of the curies of radioactivity in Hanford's former reactor production areas (100 Areas). When Site cleanup got underway with the signing of the Tri-Party Agreement in 1989, the deteriorating spent fuel in the K Basins was identified as among the top three risks and hazards at Hanford.

Fuel removal, drying, and placement in safe interim storage in central Hanford, nine miles from the Columbia River and hundreds of feet above the groundwater table, was completed by Fluor Hanford workers on a glorious autumn day. These workers removed more than 2,300 tons (2,100 metric tons) of irradiated uranium fuel – just over 4.65-million pounds, effectively neutralizing the risks formerly posed by the decaying fuel.

Removal of the nearly 105,000 irradiated, solid metal uranium fuel assemblies, containing over 50 million curies of radioactivity, earned the praise of all concerned and/or associated with the project, including the Secretary of Energy, Washington State's governor and senators, the region's congressional representative, high-level spokespersons from Oregon, Hanford's regulators, and many others.

Ron Gallagher, president and chief executive officer of Fluor Hanford, credited employees with having the expertise and determination to see the SNF Project through to completion. "I'm incredibly proud of all the people who worked so steadfastly to get all of this highly deteriorated fuel out of the Basins. These folks faced and overcame so many challenges and stresses that I really believe they can do anything! At Hanford, where cleanup now accounts for one-quarter of the Site's history, their achievement stands out as one of the most stunning victories attained by a team-oriented work force."

Even before fuel removal was complete, Fluor Hanford transitioned 100-K Area work to the KBC Project, and began removing sludge from the K East Basin and executing other actions to decontaminate and decommission (D&D) both K Basins. The Project initiated two separate sludge pumping operations in the K East Basin in June and October, and captured approximately eight cubic meters of sludge in that basin (about 20 percent of the total sludge volume). In November, a contract was awarded to treat the majority of K basins sludge, and treatment planning began with the vendor/subcontractor.

Intact fuel (left) proved easier to handle than corroded fuel (right).

Progress in sludge containerization and removal is especially important to Fluor Hanford because K Basins sludge has been elusive and difficult to manage, and because sludge removal is a precursor of many D&D actions. The sludge is an amalgam of corroded bits of spent nuclear fuel, fuel cladding pieces, debris such as windblown sand and environmental particulates, rack and canister corrosion products, ion exchange resin beads, polychlorinated biphenyls, dirt, dust, biota, and/or fission products. While heavier sludge is relatively easy to vacuum it quickly clogs strainers and other removal equipment. Lighter sludge swirls when disturbed, reducing visibility in the water and often evading capture.

Operator manipulates underwater hydrolaser cleaning walls of KE Basin, during a demonstration, spring 2004.

Fluor Hanford's K Basins D&D work achieved a major success in September when the discharge chute of the K East Basin was filled with grout (a specially formulated cement), and 105,000 gallons of contaminated water (about 10 percent of the total volume) were permanently removed from that basin. The discharge chute, a large concrete pool, 52-foot long, 20-foot deep, and about 10 feet wide, borders the K East Basin near the center of its south wall, abutting the rear face of the KE Reactor. It has served as leak point for basin water to enter the environment at least twice in the past, but filling it with grout closed off the leak pathway forever.

Fluor Hanford also successfully demonstrated the workability of underwater hydrolasing to remove contamination from the K Basins' concrete walls, and began procurement of a full-scale hydrolasing system to be deployed in the K East Basin in early 2005. Removal of contaminated tools and debris from the K Basins began in autumn 2004, with nearly 400 tools and 5,000 canisters removed from the K West Basin by year's end. Lesser amounts of debris were also removed from the K East Basin. Throughout the year, Fluor Hanford workers devised and deployed several unique tools to speed their work in the specialized K Basins environment.

New KBC vice president Pete Knollmeyer applauded the year at K Basins by telling workers: "The K Basins fuel removal endeavor was one of the most challenging projects in the DOE complex, and you met the challenge. The difficulty of working on-mask, under 16 feet of water, with long-handled, heavy remote tools, with crumbling fuel and poor visibility while trying to meet very strict safety and quality standard is almost unbelievable. I extend a hearty 'well done' for your perseverance through all the challenges. I know that with our tremendous team, we can meet the challenges that still lie ahead in the K Basins."

Michele Gerber, Communications